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USE OF PHYSICAL CULTURE TO INCREASE RESISTANCE  
OF SAILORS TO MOTION SICKNESS

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15. Abstract Studies have indicated that 50-70% of sailors are exposed to motion sickness in storms. A program of physical exercises is described and tested for effectiveness in preventing this problem. In comparing the results of tests of susceptibility to motion sickness given to groups before and after a program of exercises and to a control group, it is found that physical education can strengthen the vestibular apparatus and help prevent motion sickness.			
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USE OF PHYSICAL CULTURE TO INCREASE RESISTANCE OF  
SAILORS TO MOTION SICKNESS

By Candidate of Pedagogical Sciences, Associate Professor I. V. Salanin\*

Due to the rapid development of the USSR merchant marine and increase in /35\*\* its freight turnover today the questions of training personnel, reducing their turnover in the fleet and prolonging the labor longevity of specialists are very acute. The studies that we have done in the last 15 years indicate, that 50-70% of the sailors are exposed to motion sickness (seasickness) during storms, and of them 1/3--average and strong. This has a negative effect on their performance capacity.

Academician V. I. Volchek and his students K. L. Khilov, V. F. Udrits et /36 al. have been engaged in studying motion sickness in flight and sea work. A. I. Vozzhova and R. A. Okuneva focused a lot of attention on this question later.

However, in all work the appropriate preparation of the vestibular apparatus and study of its properties in a physiological aspect are viewed mainly as applied to aviation and astronautics.

There are a number of works [2, 3, 5] that assert, that physical culture

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\*\*Numbers in margin indicate pagination in original foreign text

and athletics can solve the problem of controlling motion sickness of sailors, however it has not been definitively solved.

Taking into consideration the set of unfavorable factors that influence the organism of a sailor during a storm, we set ourselves the following tasks:

1. to experimentally verify the set of physical exercises directed towards increasing resistance of the vestibular apparatus of sailors to motion sickness.
2. to find specific means that can be used for this purpose on shore and during navigation on ships.

The basis of our study, in addition to the use of methods of oral survey, pedagogical observation, questionnaires, were experiments conducted in three stages.

From 1964 to 1974, during studies with students of the Admiral G. I. Nevel'skiy Far East Higher Engineering Marine School we verified the influence of widespread special physical exercises on the preparation of the vestibular apparatus. The results of the check during sailing indicated, that the students participating in the experiment suffered from motion sickness three times less often.

In the second stage, in 1976, the experiment was conducted with a group of students of the II course of the Velikolukskiy branch of the P. F. Lesgaft State Twice Decorated Institute of Physical Culture. Before the beginning of studies it was suggested that the students fulfill control tests number one (with bound eyes rotation to the left six times with incline of the torso forward, arms to the side with subsequent passage of 10 m straight) and number two (with open eyes rotation to the right 10 times with incline of the torso

forward, arms to the side with subsequent passage of 10 m straight). In both tests deviations to the left and to the right were recorded (in meters). The studies were conducted three times a week for 45-60 minutes each. In the beginning the students fulfilled the exercises of the first stage. After a month of studies the control tests were conducted, indicating that the results had improved 1.5-fold.

During the second month of studies the students fulfilled exercises that we conditionally called "active": rotation (waltzing) to the left and right in a circle (with gradual increase in the number of times) with transition to walking and light running; rotation in place with incline of the torso forward (back parallel to the floor) with gradual increase in the number of rotations up to ten; this same exercise done initially in place (5-10 times) and then with movement straight; somersaults in air from a run forward (less than 5 times), somersaults over a "sawhorse," somersaults forward from a run, paired somersaults forward (double with a partner). Within a month of studies control tests number one and two again were conducted. The results for test number one had improved three-fold, for test number two--significantly.

In the last, third stage (in September-October 1978) students from the Admiral F. O. Makarov Leningrad Higher Engineering Marine School participated in the experiment. Three groups were organized: two experimental and one control. The studies in all three groups were conducted two times a week in the academic schedule, and homework was also given. Before the beginning of studies control tests number one and two were conducted. The first experimental group was given "active" exercises, only the number of rotations in place with incline of the torso forward was gradually increased from five to a series of 3 x 5, and 4 x 5.

The second experimental group fulfilled all the widespread exercises to prepare the vestibular apparatus.

The third, control group studied the school program (general physical training).

With in a month of studies the control tests were again conducted, which indicated the following. Before the experiment for test number one deviations to the side by 4-6 m and more comprised (in % of the total number of participants); first group--64.3%, second--64%, third (control)--42.1%, after the experiment: first group--8%, second--40.9%, third--53%. Thus, in the first group results improved 8-fold, in the second 1.5-fold, while the third became worse by 1/4.

One can also take another indicator--the number of students whose deviation from the assigned direction was no more than 1 m. The results for test number two before the experiment: first group--14.3%, second--12%, third--5.2%, after the experiment: first group--0%, second--0%, third--12.5%, i.e., a significant improvement was noted in the experimental groups and impairment in the control.

In organizing and conducting studies to prepare the vestibular apparatus of the students we recommend the first two exercises be entirely dedicated to a study of the entire set of exercises. In the preparatory section one can include rotation of the head, rotation and turns of the torso, jumps during running with turns by 360°, waltzing (rotation with movement ahead). Rotations of the head with movement around the hall and on a gymnastic bench, acrobatic somersaults forward and backwards, with side to left and right, different jumps over "horses" and "sawhorses" comprise the main part, further--with somersaults

forward (preparatory exercise for "somersaults" in air), turns on horizontal bar touching the head forwards and backwards. Starting with the second study "active" exercises begin to be used: rotation in place with incline of torso forward (up to 5 times) repeated twice with rest of 3-4 minutes, then the same exercise /37 is repeated with further movement straight; from a run somersaults forward in time, somersaults over "sawhorses," paired somersaults forward. In the next exercises the vestibular apparatus should be trained for 15 minutes each, in the preparatory section it is better to include lighter exercises, mainly, rotation in place with incline of torso forward (up to 10 times) with movement on a straight line; further it is necessary to gradually bring the exercises to a series of  $5 \times 5$  and  $2 \times 10$  times. The listed exercises are combined with rapid somersaults forward from a run, paired somersaults, "somersault" in air forward from a run. The intensity of fulfillment in the first two studies is low and moderate, in the subsequent--it is gradually increased. In the period of sailing due to the absence of an athletic hall we recommend the use of rotation in place with incline of the torso forward (5 times), two steps straight, 14-20 steps in place, turning in a circle. Further the number of repetitions should be gradually increased to a series of  $5 \times 5$  times.

#### CONCLUSIONS

1. in order to generate in sailors immunity towards motion sickness one can use all the exercises that are widespread in the practice of physical education and athletics to strengthen the vestibular apparatus.
2. the most effective are exercises that we have conditionally called "active." They can be fulfilled on shore and partially during navigation on ship.

It is recommended that all the exercises given above be included in the educational process for physical training in higher and secondary special schools and schools of marine personnel of the Ministry of the Navy, and that they be used by toilers in the navy and active maritime fishing, administration of the whaling flotillas, and the floating fish processing plants.

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